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### **Abstract title**

CRUST- AND MANTLE-LIKE SR-ND ISOTOPE SIGNATURES OF VARISCAN GRANITES IN IBERIA: WHAT ABOUT THEIR PETROGENESIS?

### **Authors**

DIAS GRACIETE 1, SIMÕES PEDRO P. 1, MENDES ANABELA C. 1

presenter's e-mail: [graciete@dct.uminho.pt](mailto:graciete@dct.uminho.pt)

1 - Earth Sciences Centre, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal

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### **Abstract**

Large volumes of granitoids were emplaced in the Central Iberian Zone during late-Variscan times: (1) syn-orogenic granites (320-300 Ma), controlled by the last ductile deformation phase (D3); (2) late- to post-orogenic granites (299-290 Ma) related to the brittle deformation phase D4. Available chemical and Sr-Nd isotopic data reveal that these two groups are characterised by contrasting magmatic affinities, as well as contrasting isotope compositions. Syn-orogenic granites belong to calc-alkaline (CA), Mg-K subalkaline (Mg-K SA) and aluminopotassic (AK) associations with 'crust-like' isotope signatures ( $Sr_{87}/Sr_{86} > 0.706$ ,  $\epsilon Nd < -4.4$ ). In contrast, late- to post-orogenic granites are predominantly of Fe-K subalkaline (Fe-K SA) affinity with 'mantle-like' isotope compositions ( $Sr_{87}/Sr_{86} = 0.703$  to  $0.707$ ,  $\epsilon Nd = -1.0$  to  $-2.5$ ).

The syn-orogenic group is largely heterogeneous. It includes, from the more to the less enriched isotope compositions: (i) highly peraluminous AK granites with  $Sr_{87}/Sr_{86} > 0.711$  and  $\epsilon Nd < -7.0$ ; (ii) moderately peraluminous AK granites with  $Sr_{87}/Sr_{86} = 0.709$  to  $0.711$  and  $\epsilon Nd = -5.6$  to  $-6.8$ ; (iii) slightly peraluminous CA and Mg-K SA granites with  $Sr_{87}/Sr_{86} = 0.706$  to  $0.709$  and  $\epsilon Nd = -4.4$  to  $-6.2$ . For AK granites an origin by partial melting of a heterogeneous crust is proposed. CA and Mg-K SA frequently occur in composite plutons, associated with coeval gabbro-norite to granodiorite bodies and AK granites of sub-group (ii). Both granitoids and basic-intermediate rocks show evidence of mixing/mingling phenomena. We assume that CA and Mg-K SA hybrid granites were generated by MFC processes involving coeval mantle- and crust-derived liquids. The mantle-derived melts, represented by

shoshonitic gabbros, were derived from an enriched and homogeneous source ( $\text{Sr}=0.705$ ,  $\text{eNd}=-2$ ).

We propose that Fe-K SA granites are essentially the products of mantle input, followed by some mantle-crust interaction. It must be noted that the mantle component would have a less enriched isotopic signature than the mantle-derived melts involved in the genesis of syn-orogenic hybrid granitoids.

Various interacting factors related to the nature of the protoliths, as well as the physical and chemical conditions of melting, may account for the above cited compositional/petrogenetic contrast. Changes in the melting conditions were probably related to changes in tectonics which occurred at late-Variscan times (ca. 300 Ma), from a compressive tectonic regime to extensional processes, large-scale uplift and thinning.

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